

ABSTRACT OF THE DISCLOSURE

A quantum memory includes memory cells each comprising a physical system ensemble, quantum information of the physical system ensemble being expressed by a quantum state of whole amount of the total angular momentum of the physical systems, and the memory cells including two storage memory cells storing the quantum state and a transfer memory cell transferring the quantum state, only two of the memory cells being present on a straight line. The quantum memory also includes a magnet applying a magnetic field to the two storage memory cells and the transfer memory cell, a first light source irradiating the two storage memory cells and the transfer memory cell with right-handed or left-handed polarized light, a second light source simultaneously irradiating one of the two storage memory cells and the transfer memory cell with a laser beam, and a detector detecting a polarization state of the laser beam.